Comparison of Self, Other, and Subjective Video Models for Teaching Daily Living Skills to Individuals with Developmental Disabilities

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Abstract: This study compared the effectiveness of self-, other-, and subjective-video models on teaching daily living skills to three individuals with developmental disabilities. Results indicated that all conditions were effective in promoting independent correct responding in both instructional and generalization settings and that the effects maintained over time. Two of the three participants engaged in more independent correct responding when they were taught skills with the other model condition, while the other participant engaged in more independent responding on the target skill when the subjective model condition was the instructional procedure. However, there were significant differences between the model types when time needed to create the stimulus materials was considered. Creation of self-modeling materials required almost twice as much time as the other- and subjective-modeling materials, which made self-models less cost effective in terms of teacher time and outcomes.

Video instruction is considered a “promising practice” for teaching a variety of skills such as cooking, cleaning, spelling, social skills, communication, as well as other life skills to individuals with developmental disabilities. It involves showing learners a video of a model (i.e., self, peer, expert, or “first person viewpoint”) performing a skill or skill sequence. Typically, these videos are viewed either on a television or computer prior to task engagement (video modeling) and the learner is expected to perform the skill shortly after viewing the video. To date, researchers who have studied video-based instruction have demonstrated that it usually results in faster skill acquisition on the part of the learners and that the skills can often generalize to untrained settings (Ayres & Langone, 2005; Hitchcock, Dowrick, & Prater, 2003; Mechling, 2005).

Although video instruction appears to be a very effective instructional tool, there are many variables associated with video instruction that need to be evaluated to determine how it can be more efficient and effective for the learners as well as the educators who will be responsible for creation of the materials. Research is needed to investigate the combinations of variables that will result in the most effective and efficient implementation package for video-based instruction (Cihak, Alberto, Kessler, Taber-Doughty, & Gama, 2006).

Type of Model (self, other, subjective)

One of the variables associated with video modeling that is in need of further study involves the type of model that is depicted in the video sequences. Some researchers have used self models (Buggey, 2005), peer models (Haring, Kennedy, Adams, & Pitts-Conway, 1987; Lasater & Brady, 1995), adult models (Alcantara, 1994; Charlop & Milstein, 1989), first person or “subjective viewpoint” (where video is shown from the perspective of the individual performing the task) (Schreibman, Whalen, & Stahmer, 2000), or a combination of models (Morgan & Salzberg, 1992; Van Laarhoven & Van Laarhoven-Myers, 2006; Van Laarhoven, Van Laarhoven-Myers, & Zurita, 2006).
Although all of these investigations resulted in improved performance, it is unclear whether or not one type of model would be better than the others or if one type of model would be more effective for a particular type of skill (e.g., social versus academic skill).

Self-modeling. Video self-modeling (VSM) is a technique that allows learners to observe themselves engaging in positive performances of a target behavior and has been used to teach skills such as math (Schunk & Hanson, 1989), language (Buggey, 1995; 2005), and social skills (Buggey, 2005; Lonnecker, Brady, McPherson, & Hawkins, 1994). Video self-modeling is thought to be effective because the learners can view themselves successfully performing a skill that may be difficult. By viewing their own successful performances, the learners are thought to be more interested and more confident in their abilities. The instructional materials are developed by either prompting the individual to perform the task during taping and editing out the “prompter”, or by videotaping the learner over a period of time and using only the footage that shows the individual performing the skill successfully. The drawback to this type of model is the time required to create the stimulus materials (videos). Because the learners serve as their own models, a great deal of time must be spent editing out the prompter or editing footage that has been videotaped over an extended period of time.

Other models. Several researchers have used models other than the learner to demonstrate skills, or to serve as models in instructional videos. Most cite the work of Bandura (1977) and his Social Learning Theory, which describes how humans can learn from observing others engaging in behaviors and by observing the consequences that follow. Based on this work, other models (typically adults) and peer models have also been used with video-based instruction. Some researchers have followed the work of Bandura (1969) and have suggested that the most effective “other” models are those who share common features with the learners (e.g., age, gender) and have chosen peers to serve as instructional models. Peer models have been used to instruct persons on community skills (Branham, Collins, Schuster, & Kleinert, 1999; Haring et al., 1987), vocational skills (Martin, Mithaug, & Frazier, 1992), social skills (Nikopoulos & Keenan, 2004), and cooking skills (Bidwell & Rehfeldt, 2004; Rehfeldt, Dahman, Young, Cherry, & Davis, 2003). Videos using models of other individuals instead of peer models have been used for a variety of skills including social and communication skills (Charlop & Milstein, 1989; Charlop-Christy, Le, & Freeman, 2000; Conyers, et al., 2004; LeBlanc, et al., 2003), daily living skills (Van Laarhoven & Van Laarhoven-Myers, 2006), and community skills (Alcantara, 1994; Ayers & Langone, 2002). Typically, the use of other models requires less time for material creation because the models that are depicted usually have the skills of interest in their repertoire and less editing time is required. However, depending on the age and/or cognitive level of the models, peer modeling can require more time than that of adult models. On the other hand, it would probably require less time than is required for the creation of video self models. In one of the very few comparative studies that exist with video-based instruction, Sherer, et al., (2001), compared video self-modeling with other models to teach conversation skills to five children with autism. Results indicated that, although there was some variability among participants, both conditions were equally effective in terms of percentage correct engagement and rate of acquisition.

Subjective models. Another approach that minimizes the need for extensive editing is the use of subjective viewpoint models or first-person perspective models. With this approach, the learner watches the video as if they were completing the task themselves. Typically, there is no model present, but rather, learners watch a video that shows what it would look like if they were completing the task. Subjective models have been used for video instruction of various skills, including self help skills (Norman, Collins, & Schuster, 2001), daily living skills (Shipley-Benamou, Lutzker, & Taubman, 2002), behavior regulation/transitioning from one activity to the next (Schreibman, et al., 2000), and cooking skills (Graves, Collins, Schuster, & Kleinert, 2005). In a comparative study, Ayres and Langone (2007) compared first-person (subjective) models with third-person (other) models and found that although there was...
some variability among participants related to efficiency, both models were equally effective.

Although different types of models have been used to teach various skills, several questions still remain unanswered in the research literature. For example, is one type of model (self, other, subjective) more conducive or more effective and efficient for teaching specific types of skills to individuals with disabilities? And, are any of the model types more cost effective in relation to teacher requirements (time needed to create materials) and student outcomes (e.g., time and number of sessions to criterion; growth between pre- and post-measures)?

The purpose of this study was to compare different types of models depicted within the instructional sequences to determine if there were differences regarding the effectiveness of each model. Cost benefit or “efficiency analyses” were conducted in order to assess the practical utility of each video-based procedure. These “costs” were compared to the accrued benefit to the participants as measured by the relative effectiveness of each condition.

Method

Participant Selection

Participants were recruited from high school programs located in the suburbs of Chicago. To recruit, a description of the study was e-mailed to teachers in several school districts. Of those who responded, a follow-up questionnaire was sent to: 1) identify specific skills for instruction, 2) determine availability of the participant, and 3) obtain personal information for the participant to obtain informed consent and assent. Participants were then selected from the pool of respondents based on similarity of IQ scores, skills requiring instruction, and scores on pretests.

Participants

Two females and one male with moderate disabilities (IQ range 35–55) between the ages of 12–17 participated. All participants came from homes where Spanish was the primary language, all had similar skills requiring instruction, and all were functioning within the moderate range of mental retardation.

Pablo was a 17-year-old high school student with Down syndrome who functioned in the moderate range of mental retardation. His full-scale IQ score on the WAIS-III (Wechsler, 1997) was 40. He received special education services in a self-contained classroom to meet his individualized needs. He was also involved in a vocational training program and worked on skills such as item assembly, washing tables and chairs, and also worked on functional academic skills such as money handling and reading. He generally required direct instruction and practice/repetition to acquire or attain new and/or difficult skills and prompting to stay on task. Behaviorally, Pablo was fairly even tempered, but did have a tendency to exhibit non-compliant behaviors when asked to complete tasks that were outside of his normal routine, were unfamiliar, or non-preferred.

Alanna was a 15-year-old female who functioned within the moderate range of mental retardation. Her full-scale IQ score on the Leiter International Performance Scale-Revised (Roid & Miller, 1997) was 30. She received special education services in a self-contained classroom where she practiced academic skills, basic domestic skills such as cooking and cleaning, and vocational skills such as gathering recycling and sorting and assembling piece work. Alanna was quite distractible and required cueing, prompting, and redirection to focus on the task in which she was engaged, and also needed a great deal of repetition and direct instruction to acquire new skills.

Breanne was a 12-year-old girl who was functioning within the moderate range of mental retardation. Although her files indicated that the Stanford-Binet-Fourth Edition (Thorndike, Hagen, & Sattler, 1986) was administered several years prior to her participation in the study, there was no IQ score listed. However, the report indicated that she was functioning within the moderate range. Breanne received special education services in a self-contained classroom where she practiced academic skills such as reading sight words, telling time, counting money, as well as daily living and pre-vocational skills. She had a very pleasant personality and was willing to work hard on whatever task she was
given. She frequently praised her own work as well as the work of others (e.g., “you did it”!)

Setting

Instructional sessions were conducted in three different areas in the school. Cooking hot dogs was done in a café in the school. It was a large room that had two L-shaped kitchenettes on one wall and then long rectangular tables or circular-shaped tables spread throughout the remainder of the room. The room appeared to have been used as a home economics room in the past. Cleaning a sink was done in a bathroom that was located in a “mock house” that was in the school, and changing batteries was done at a dining table that was connected to the mock house. Once participants met criterion (80% independent correct responding for three consecutive sessions), they were assessed on their ability to generalize the skill to novel environments (settings other than those used during instruction) while using different stimulus materials than were used during instructional sessions (e.g., different microwaves, brands of hot dogs, cooking equipment, battery-operated devices, and cleaning supplies). The generalization sessions for cooking hot dogs were conducted in the mock house kitchen, cleaning the sink was done in a bathroom that was connected to a classroom, and changing batteries was done at a table in the café.

Instructional and Generalization Stimulus Materials

All video-based materials were developed in the settings where instructional sessions took place. In addition, participants used a different set of materials in the instructional sessions than were used in the generalization settings. For example, Oscar Mayer hot dogs, Jewel brand buns, a black oven mitt, black-handled silverware, a blue plate, and a microwave and refrigerator located in the café were used for instructional sessions for cooking hot dogs. Ekrich hot dogs, Wonder hot dog buns, a green oven mitt, green-handled silverware, a green plate and different microwaves and refrigerator located in the mock house were used for generalization sessions. For the battery tasks, different battery operated devices were used in instructional (i.e., Roomba wall unit with D-sized batteries) versus generalization conditions (i.e., Tetris handheld game with AA-sized batteries). The batteries differed by brand and size, as did the types of screwdrivers that were used. Similarly, cleaning buckets that held different brands/colors of cleaning supplies (i.e., pink sponge, Fantastik cleaner, white bucket) were used in the mock house bathroom for instructional sessions while a different colored bucket and cleaning supplies were used to clean in the generalization setting (bathroom off of a classroom).

Skills Selected for Instruction

Each participant was taught three different skills (one per instructional condition). The targeted skills fell within the domestic or daily living domain, however, each student was taught skill sequences from three different sub-domains within the domestic realm (i.e., cooking, cleaning, maintenance) to ensure that the responses across the skill sequences were mutually exclusive and independent of one another. These skills included cooking a microwave hot dog, cleaning a bathroom sink, and using a screwdriver and changing batteries in different devices (i.e., a Roomba wall unit and a handheld game).

Controlling for Task Difficulty and Practice Effects

Once several skills were identified for possible inclusion in the study, task analyses were written for each sequence and four different teachers who had been teaching for at least two years rated them according to complexity and difficulty (easy, moderately difficult, & difficult). They then ranked skills within each difficulty level to determine which skills were equivalent in terms of complexity. Results of the ratings were used as a guide for determining skills to be targeted for instruction. In addition, participants’ pretest scores were used to equate the skills. In order to control for participant skill level prior to instruction, the scores for instructional pretests and generalization pretests were averaged and ranked. Each participant’s task with the highest score was randomly assigned to one of the three
different conditions and the tasks with the lowest scores were assigned to three different conditions when possible. To control for practice effects, all participants were videotaped engaging in all three of the tasks prior to instruction. This was done to reduce the likelihood that practice would improve their performance within the self model condition.

**Design**

The design for this study was a within-subject adapted alternating treatments design (Wolery, Bailey, & Sugai, 1988). It differs from the alternating treatments design in that the treatments are applied to different but equally difficult, independent behaviors/skills, whereas, in the alternating treatments design, the treatments are applied to the same behavior/skill. With this design, two or more treatment conditions are introduced in a rapidly alternating fashion with the order of presentation being randomized. Each participant was taught a different skill within each condition and the skills were counter-balanced across conditions and subjects to control for task difficulty. The skills were assigned as indicated in Table 1.

**Independent Variables**

**Condition 1: Self Model.** Participants viewed a video-based multimedia sequence of themselves engaged in the skill prior to task engagement.

**Condition 2: Subjective Model.** Participants viewed a video-based multimedia sequence that was created as if they were performing the skill sequence (i.e., what it would look like from a first person perspective).

**Condition 3: Other Model.** Participants viewed a video-based multimedia sequence of another person (an adult female) engaging in skill sequence prior to task engagement.

**Instructional Materials**

The lead author/experimenter, who is an adult female, served as the model for both the “other” and “subjective” conditions, and the participants served as their own models during the “self-model” conditions. Video segments were shot in the settings where instruction took place. For the “other” condition, a combination of wide angle (full view of the model) and a few zoom shots (showing the arm of the model reaching for hot dogs) were used. When the subjective model was created, the videographer placed the camera on the lead author’s shoulder while she performed the task. The resulting materials showed the task being completed from a first person perspective and usually only the hands of the experimenter were shown. For the “self” models, each participant was videotaped engaging in the skill sequence and the prompter and/or mistakes were edited out of the video. Again, to minimize practice effects for the self-model conditions, all participants were videotaped engaging in all three skill sequences; however, only one self-model video was used for each participant during the study.

Skill sequences (e.g. making a microwave hot dog) were broken into short video segments (for each step). Photos of the most salient feature of the steps (e.g., a still of water being squeezed from a sponge) were “grabbed” out of the video and placed at the beginning of each video segment. Each video segment, or each step of the task was edited using Pinnacle Studio 10.1™ (Pinnacle Systems, 2005) and saved as a separate file and then later placed on a PowerPoint™, 2003 presentation. Each slide in the PowerPoint™ had written directions for each step on the top of the screen, the “grabbed” photo visible in the middle of the screen, and narration that described the step to be completed. The slide show was set so that the participants had to move the cursor to the photo and use a mouse click to view the video and a mouse click on a hyperlinked “next” button on the bottom right of the screen to advance to the next slide. Please refer to Figure 1 for an example screenshot.

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**TABLE 1**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Self</th>
<th>Subjective</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pablo</td>
<td>Hot dog</td>
<td>Clean sink</td>
<td>Batteries</td>
</tr>
<tr>
<td>Alanna</td>
<td>Batteries</td>
<td>Hot dog</td>
<td>Clean sink</td>
</tr>
<tr>
<td>Breanne</td>
<td>Clean sink</td>
<td>Batteries</td>
<td>Hot dog</td>
</tr>
</tbody>
</table>

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Instructional Sessions

Video modeling, or viewing the video-based sequence prior to task engagement, was used for all of the instructional sessions. Participants sat at a large dining table in the mock house in the school and independently navigated through the PowerPoint presentation that was loaded on a laptop computer. Once participants viewed the video sequences, they then immediately engaged in the instructional task.

Training Participants to Use Technology/photos

Prior to engaging in instructional sessions, each participant was taught to operate the laptop and to navigate through the PowerPoint™ presentation (i.e., using a mouse click to view the video segment and advance to the next slide) independently for two consecutive sessions before they engaged in the instructional task.

Data Collection Procedures

During pre/post-testing, acquisition phases, and generalization testing, task analytic data were collected with correct and incorrect performance being reported on each step of the skill sequence. A ‘+’ was recorded for independent correct responses, a ‘A−’ was recorded for incorrect attempts, an ‘N−’ was recorded for no attempt, and an ‘S−’ was recorded for a sequence error. During acquisition phases, data were also collected on prompt levels and a ‘√’ was recorded for each prompt given at each step (with a maximum of two per step). To obtain data on prompt levels, a two-level prompting hierarchy was used. In the event of an error or no attempt within 5 seconds of the natural discriminative stimulus, participants were given a verbal prompt to respond. If the verbal prompt was not sufficient to prompt a correct response, a gestural or physical prompt was provided (depending on what was necessary for the particular step) to ensure correct responding.

Dependent Measures

Percentage of independent correct responses. Participants were assessed on how independently they performed the skills selected for instruction prior to engaging in the instructional sequences (pretest), during instruction (acquisition), and following instruction (posttest). The score was determined by dividing the number of steps with independent responding by the total number of steps in the skill sequence and multiplying by 100. Pre/post tests differed from instructional sessions in that participants were expected to perform the skill in the training/generalization environment without video models. In addition, no prompts were delivered during testing. If participants made errors during the testing phases, the experimenter asked them to turn away or close their eyes as the step with the error was completed for them. Post-tests were conducted in the instructional setting one or two days after participants met criterion on all three tasks and the generalization and maintenance post-tests were conducted 1- and 6-weeks following training (in environments that were different than the instructional setting).

Percentage of prompts. Participants were assessed on the number of external prompts they needed to complete the skill sequence during acquisition phases of the study. The score was determined by dividing the number of prompts given by the total number of prompts possible (i.e., two per step) and multiplying by 100.

Number of sessions to reach criterion. The acquisition criteria for each skill sequence was a score of 80% independent correct responses or higher for three consecutive sessions. The
number of instructional sessions required for the participant to reach criterion was counted to determine if any of the instructional conditions resulted in faster acquisition.

**Percentage of independent correct responses on measures of generalization.** Prior to and following instruction (at 1- & 6-weeks), participants performed the skill in novel environments without video materials or prompting to obtain baseline levels and to determine if their skills generalized to untrained environments and stimulus materials following instruction.

**Efficiency measures.** An efficiency score was computed by considering the ratio of each participant’s growth (from pre-test to post-test) to the measured “cost” of minutes required to create instructional materials [i.e., (posttest-pretest)/(minutes of preparation)]. To determine the number of minutes of preparation, a stop-watch was used to calculate the number of minutes to videotape, capture the video, edit the video, and to prepare the video-based instructional sequences.

**Data Analysis**

Experimental control was determined primarily through visual inspection of the data and through comparisons of means for each condition. With the adapted alternating treatments design, experimental control is demonstrated by a consistent level and/or trend difference between the interventions (Wolery et al., 1988). At a quick glance, one can determine if one intervention is better than the other if there is little or no overlap between the data paths. In addition, although baseline measures are not necessary with the alternating treatments design, the pre/post scores for each condition were also compared.

**Reliability**

Additional authors conducted reliability sessions for 28% of all sessions (including pre/post-tests and instructional sequences). The percentage agreement index (i.e., number of agreements divided by number of agreements plus disagreements and multiplied by 100) was used to calculate interobserver agreement. Agreement for independent correct responses averaged 98% (range = 93–100). Agreement for Instructional prompts across sessions resulted in a mean score of 95% (range = 83–100). In addition, the second observer collected procedural reliability data (Billingsley, White, & Munson, 1980). These measures included the following: a) checking to ensure that the correct condition was being applied to the intended task for each participant, b) checking to determine if the order of tasks were presented as stated in the research protocol, c) checking to make sure that the correct stimulus materials were used, and d) that the prompting hierarchy was delivered as intended. Reliability was calculated by dividing number of correct measures by the total number of assessed variables and multiplying by 100. Procedural reliability agreement averaged 100%.

**Results**

All of the instructional procedures were effective in increasing independent responding and/or decreasing prompting during acquisition for all participants, however, some differential effects were observed between the conditions.

**Percentage of independent correct responses.** When the percentage of independent correct responses were measured across conditions/tasks, the data clearly indicated that all conditions or models were effective in increasing independent responding for all participants. During acquisition, Pablo and Breanne engaged in more independent correct responding during acquisition with the “other” model condition while Alanna engaged in more independent responding during the “subjective” model condition (see Figure 2).

Pablo engaged in more independent correct responding when the "other" model condition was used \( (M = 87) \) followed by “self” model \( (M = 81) \) and “subjective” model \( (M = 73) \). Breanne also had higher independent correct responding when the “other” model was used \( (M = 90) \) followed by the “subjective” model \( (M = 84) \) and then “self” model \( (M = 71) \). Alanna engaged in more independent correct responding when the “subjective” model was presented \( (M = 88) \) followed by “self” model \( (M = 69) \) and “other” model \( (M = 66) \).

During post-test phases, participants no longer viewed the videos prior to task engage-
Figure 2. Percentage of independent correct responding across phases and participants.
ment. This was done to determine if the participants improved their independent correct responding without video-based supports. They were tested using instructional materials in the initial post-test one or two days after reaching criterion on all three tasks. They were then given a generalization post-test one week later and again at six weeks after reaching criterion.

When post-test data were analyzed, Pablo continued to engage in more independent correct responding with the task he was taught using the “other” video model during instructional and generalization post-tests and these effects maintained over a 6-week period of time. Although Breanne also continued to have more independent correct responding with the “other” model condition as measured by the instructional post-tests, she had more independent correct responding with the “subjective” model condition when generalization was measured with the generalization post-test. However, this was not maintained and she performed better with the “other” model condition at the 6-week maintenance post-test. Alanna continued to engage in more independent correct responding when the “subjective” model was used as the instructional method and these skills also generalized to other settings and materials and were maintained over time.

Although every attempt was made to identify tasks of equal difficulty and to account for skill level prior to instruction, the cleaning sink task appeared to be the most difficult for all participants regardless of condition. However, each participant engaged in that task and the tasks were counter-balanced across all three modeling conditions. When the mean scores of participants were combined according to the type of model, the “subjective” model condition was associated with the highest independent correct responding during acquisition ($M = 82$) followed closely by the “other” model condition ($M = 81$) and the “self” model condition ($M = 74$) (see Figure 3). When the mean scores of participants were combined across conditions during instructional post-tests, the “other” model condition was associated with the highest independent correct responding ($M = 98$) followed by the “subjective” model condition ($M = 95$) and the “self” model condition ($M = 88$). Similar results were found with the one-week generalization post-tests with the “other” model condition being associated with the highest scores ($M = 92$) followed by the “subjective” model condition ($M = 90$) and the “self” model condition ($M = 86$). At the 6-wk test, the “subjective” model condition had the highest mean scores ($M = 90$) while the “other” and “self” model conditions were not far behind ($M = 88$). Overall, it appears that all three of the modeling conditions resulted in relatively high percentages of independent correct responding across all phases of the study. The “other” and “subjective” model conditions were associated with slightly higher percentages of independent correct responding during both acquisition and generalization, while all three conditions appeared to be somewhat similar in terms of maintenance.

Percentage of prompts. During instructional sessions, if the participants made errors, a two-step error correction prompting sequence was provided if necessary. Following errors, participants were first given a verbal prompt to perform the step. If they responded correctly, no additional prompts were given. If the participants made another error, a controlling modeling or physical prompt was delivered to ensure correct responding. As was expected, participants received fewer prompts in the conditions where they had the most independent correct responding. Pablo and Breanne received the fewest prompts when the “other” model condition was used while Alanna received the fewest percentage of prompts when the “subjective” model was used. When the mean scores were combined across participants, the “other” model was associated with
the fewest external prompts \((M = 11)\), followed by the “subjective” model \((M = 13)\) and “self” models \((M = 16)\) (see Figure 4).

**Number of sessions to criterion.** To determine if any of the modeling conditions were more efficient than the others, the number of sessions to reach criterion (i.e., three consecutive sessions with 80% or higher independent correct responses) was also analyzed. Alanna and Breanne reached criterion more quickly when the “subjective” model was presented, while Pablo reached criterion more quickly when the “other” model was used. When the mean number of sessions were combined across participants and modeling conditions, the “subjective” and “other” model conditions required an average of 9.33 sessions to criterion while the “self” model condition required an average of 11.33 sessions to criterion (see Figure 5).

**Efficiency measures.** In order to determine which of the procedures was more cost effective, an efficiency score was calculated by considering the ratio of each participant’s growth (from pre-test to post-test) to the measured “cost” or minutes that were required to prepare the instructional materials. This score was calculated to determine if one type of model would be more efficient than the others in terms of teacher/caregiver time to create the materials and to measure the practical utility of each procedure. Results indicated that the “other” model condition was more cost effective for two of the participants while the “subjective” model condition was more cost effective for the third participant. With the exception of Pablo, the “self” models were the least efficient of the models (see Figure 6). When the efficiency scores were combined across participants, the “other” model condition was the most efficient \((M = 1.25)\), followed by the “subjective” model condition \((M = 1.17)\), and finally the “self” model condition \((M = .61)\). In essence, each minute of time spent creating the materials “bought” an increase of 1.25 percentage points from pre- to post-test scores for the “other” model, 1.17 percentage points for the “subjective” model, and .61 percentage points for the “self” model, indicating that the other and subjective models were almost twice as efficient as the self models.

**Discussion**

In summary, all three of the video models were effective at increasing independent correct responding for all three participants. When means were combined across conditions, the “other” and “subjective” models appeared to be more effective and efficient than “self” models across all of the dependent measures. The “other” model condition was associated with somewhat higher scores in terms of independent correct responding for two of the participants for acquisition, maintenance, and generalization, while the other participant performed better during acquisition, maintenance, and generalization when the “subjective” model was used. Fewer external prompts were also used for two of the participants when the “other” model condition was in place while the third participant required fewer external prompts when the “subjective” model condition was in place. When the number of sessions to reach criterion were evaluated, two of the participants met criterion faster when the “subjective” model was presented while the third participant met criterion faster when the “other” model condition was in place. In addition, both the “other” and “subjective” models were far more efficient than “self” models when the time to create the materials were considered in relation to the amount of growth under each condition.

Self models appeared to be the least effective of all the model types across the different dependent measures, in particular, when the efficiency scores were calculated. Because the participants served as their own models and were not adept at performing the skill sequences, the videotaping and editing necessary for the development of the “self” modeling materials required far more time than the “other” and “subjective” models, thus making it less efficient. This is an important finding especially considering that a frequent criticism of video-based instruction is that the time to create the materials is a shortcoming that prevents its widespread use in applied settings. To reduce this limitation, it makes sense to use models that are more efficient and cost effective and perhaps using “other” or “subjective” models when teaching functional skills is the most logical and practical approach. In addition, using video-based mate-
Figure 4. Percentage of prompts across participants and conditions.
rials that present “other” and “subjective” models has the added advantage of being used across learners whereas “self” models do not.

In addition to being less efficient in terms of the time required to create the instructional materials, “self” models also resulted in lower scores when independent correct responding was analyzed across participants. One surprising outcome of this study was that the participants seemed to respond somewhat differently when they viewed the “self” models versus the “other” or “subjective” models. Although they were excited to see themselves on the computer and would often say things like, “Look! That’s me!”, they also often commented on things that were unrelated to the task. For instance, Pablo frequently pointed out the bruise on his arm in the hot dog video and then wanted to discuss how he got it from fighting with his brother. Alanna and Breanne frequently commented on the clothes they were wearing in the video (e.g., “That’s my favorite shirt”, “I’m wearing that same outfit today!”) and they all seemed to attend more to the irrelevant stimuli that were present in the “self” model videos rather than the task that was being presented. A possible explanation for the lower mean scores with independent correct responding with the self modeling tasks might be attributed to the fact that the participants were “star struck” and were attending to themselves or what they were wearing in the videos rather than the task that was being presented.

Although all of the video models appeared to be effective, one limitation to the study is that the participants performed less well when they were cleaning the sink. This was definitely a non-preferred task for all of the participants and it appeared to be somewhat more difficult than the other tasks regardless of the type of model that was used. Pablo and Alanna, in particular, did not like cleaning the sink and often verbalized their displeasure with having to clean it. Pablo often engaged in avoidance behaviors during the task (e.g., pretending to dry his hands on the heating vents; frequently adjusting the blinds on the bathroom window to obtain the best light; repeatedly wringing the sponge with exaggerated force), and although his antics were quite amusing at times, prompts often needed to be delivered to get him to complete the next step in the task sequence and this resulted in fewer steps with independent correct responding. Alanna also would throw the sponge in the sink after she completed a few steps and would declare that she “was done”. In addition, the cleaning task was probably more difficult because the stimulus/response relationships were less clear than with the other tasks. For example, once the hot dog was in the microwave, it was more clear that the next response would be to set the timer, whereas, after wiping the inside of the sink, the next step was not as obvious. However, all of the participants were required to engage in this task and each model type was represented. By combining the means across dependent measures it was possible to identify the differential effects of each of the modeling conditions.

Although all the video models increased independent responding across tasks, they were used in conjunction with a two step prompting sequence. As a result of using this combination, it cannot be stated that the video modeling procedures alone were responsible for the changes in student responding. Future research might be directed at in-
vestigating use of the video sequences in isolation rather than in conjunction with a prompting system (e.g., system of least prompts) or within the context of fading approaches (gradually fading out video models).

Research on video-based instruction to date has involved the use of different types of models to teach a broad range of skills; however, several questions still remain unanswered in the research literature. For example, is one type of model (self, other, subjective) more conducive or more effective and efficient for teaching specific types of skills to individuals with disabilities? Are different skill categories (academic/cognitive, social/communicative, and behavioral/self-regulatory skills), more conducive to specific types of models when teaching individuals with disabilities? And, depending on the type of skill that is taught, are any of the model types more cost effective in relation to teacher requirements (time needed to create materials) and student outcomes (e.g., time and number of sessions to criterion; rate of acquisition)? Future research should focus on answering these questions, as well as others, to ensure that the most efficient and effective models are used to improve the practicality and efficacy of video-based instruction across different types of tasks and populations.

References


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